TriStar II Plus

Installation Instructions and Checklist

Rev A

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Overview

This six part document describes how to install and verify operation of the TriStar II Plus analyzer.

The *Installation Instructions* contain procedures for installing and verifying the operation of the TriStar II Plus system. Use the installation instructions and the installation checklists to ensure that installation procedures are completed properly.

Conventions

This document uses the symbols shown below to identify notes of importance and cautions:

Notes contain a tip or important information pertinent to the subject matter.

Cautions contain information to help prevent actions which could damage the instrument.

Warnings contain information to help prevent actions which could cause personal injury.

Dewar Precautions

Always handle Dewars with care. Any product incorporating a vacuum is a potential safety hazard and should be treated with caution. Always observe the precautions listed below.

Micromeritics recommends the following be observed when handling Dewars containing liquefied gases:

- Protect yourself by wearing all of the following:
  - goggles (or a face shield)
  - an insulated or rubber apron
  - insulated gloves
- When pouring liquefied gases from one container to another:
  1. Cool the receiving container gradually to minimize thermal shock.
  2. Pour the liquefied gas slowly to prevent splashing.
  3. Vent the receiving container to the atmosphere.
- Use a plastic stirring rod when stirring substances in a glass Dewar containing liquefied gases (or other materials suitable for extremely low temperature). Do not use a glass or metal stirring rod unless it has a protective coating.
- Do not handle heavy objects above a glass Dewar. If unavoidable, place a protective cover over the Dewar's opening. If an object of sufficient weight is accidentally dropped into the Dewar, shattering may occur.

Preparing for Installation

Before installation, ensure the customer has thoroughly reviewed the TriStar II Plus Preinstallation Checklist. Ensure all required equipment and supplies are unpacked and the required personnel are available.

Part 1. Hardware Installation

Installing the Vacuum Pump

The analyzer requires an external vacuum system that meets these specifications:

- **Nitrogen analyzer -** the vacuum system must accommodate 20×10^{-3} mmHg or better and use either an oil-based or oil-free vacuum pump.

- **Krypton analyzer -** the vacuum system must accommodate 0.1×10^{-3} mmHg. An oil-free vacuum pump is required.

Two types of pumps are available from Micromeritics:

Oil-based pump - used primarily for nitrogen and nitrogen-like analyses.

High-vacuum and dry-pump combination - used primarily for krypton analyses.

Use the appropriate instructions for the customer's vacuum pump.

- Oil-based Pump
- High-Vacuum / Oil-free Pump Combination
- Non-Micromeritics Provided Vacuum Pump

Oil-based Pump

Supplies needed to install an oil-based pump with alumina trap.

Micromeritics Supplied	User Supplied
Vacuum pump	Drying oven
Alumina	Flat-blade screwdriver
Alumina trap	10 mm screwdriver
Exhaust port filter	
Vacuum pump hose	
Clamps	
Pump oil	

Preparing the Alumina

1. The activated alumina must be thoroughly dried before using. Preheat the drying oven to 300 °C.

2. Pour approximately 180 grams of fresh alumina into a glass or metal container (250 ml if a graduated beaker is used). Place the container into the preheated oven.

Do not perform this procedure on used alumina. Resultant oil vapors may cause a fire or explosion.

3. Bake the alumina for two hours. Remove the baked alumina from the over and allow to cool until lukewarm.

Preparing the Alumina Trap

1. Insert an O-ring into each of the end fittings.

2. Screw one of the end fittings onto the trap clockwise.

3. Ensure that the trap body is dry and the alumina pellets are cool. Pour the pellets into the trap until they are level with the top of the trap body.

Ensure that the alumina pellets are cool. Adding hot pellets to the trap body may warp the body and cause an improper seal of the O-ring.

4. Screw the other end fitting onto the trap and tighten securely by hand.

5. Lightly tap both ends of the trap body on the work surface to remove remaining dust from the pellets.

Closing the Ballast Valve

The ballast valve should remain closed during the operation to obtain the best vacuum. Ensure the valve is turned completely clockwise.

Installing the Alumina Trap

1. Lift and remove the cap on the intake port.

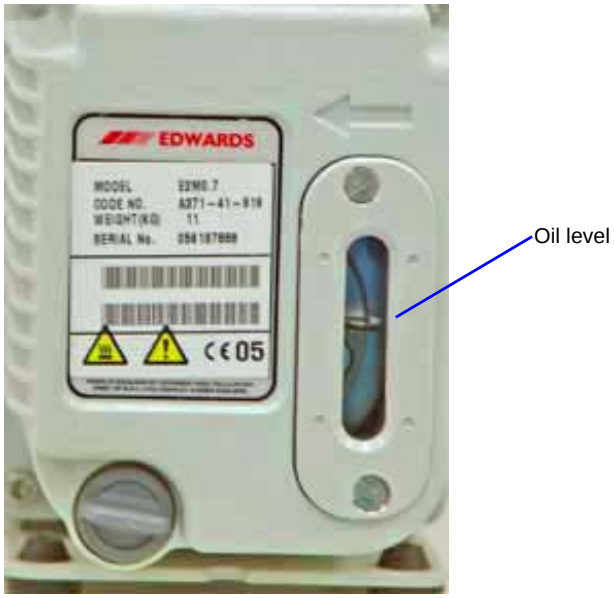
2. Place a centering ring on the intake port. There are two types of centering rings. Use the one with the smaller opening.

3. Place the trap on the centering ring.

4. Place an opened clamp around the flange of the intake port and the flange of the trap. Swing the clamp fastening screw toward the intake port until it fits into the slot in the other half of the clamp. Tight the wing nut securely by hand.

Check the Pump Oil Level

1. Check the level of the vacuum pump oil. The oil level should be halfway between the indicator lines in the oil-level window.

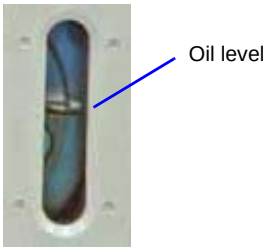


2. If oil needs to be added, go to Step 3. If oil does not need to be added, proceed to Installing the Exhaust port Filter on page 13.

3. Remove the plug from the oil-fill port.

4. Slowly add fresh oil to the port until the level is midway between the indicator lines in the oil-level window on the front of the pump.

Do not allow oil to rise above the midway position. Doing so may cause oil to splash into the exhaust filter and contaminate it.



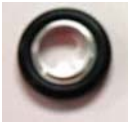
5. Replace the oil-fill plug. Turn clockwise to tighten.

Installing the Exhaust Port Filter

1. If the exhaust port is closed with a clamp, loosen the wing nut of the clamp at the exhaust port. Swing the clamp away from the exhaust port and remove it.

2. Ensure the centering ring remains on the port. If the exhaust port is closed with a cap, remove the cap.

3. Place the filter on the centering ring. There are two types of centering rings. Use the one with the larger opening.



4. Open the clamp and place it around the flange of the exhaust port and the flange of the exhaust filter.

5. Swing the clamp fastener screw toward the exhaust port until it fits into the slot in the other half of the clamp. Tight the wing nut securely by hand.

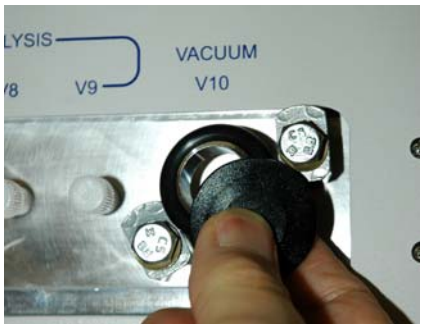
Attaching the Hose

1. Place the centering ring on the oil vapor trap. There are two types of centering rings. Use the one with the larger opening. Then place a hose adapter on the centering ring.

2. Place the clamp around the vapor trap. Swing the clamp fastener screw around until it fits into the slot on the other half of the clamp and tighten the wing nut securely by hand. Then attach the hose to the port.

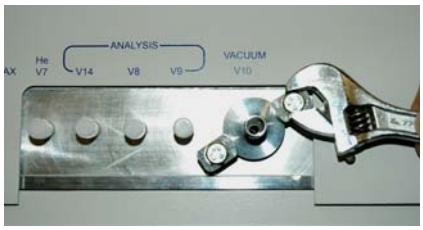
3. Place a hose clamp on the hose and tighten the retaining nut with a flat-blade screwdriver.

4. Loosen the screws on the vacuum port on the rear panel of the analyzer, then remove the plug and centering ring.

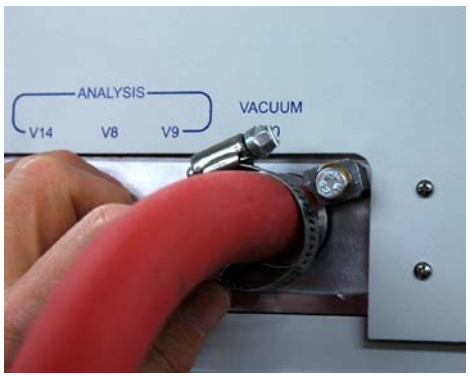


5. Place the centering ring removed in Step 4 onto the vacuum port adapter.

6. Place the vacuum adapter in the vacuum port, then tighten the two port screws by turning then clockwise with a wrench.



7. Place the vacuum hose over the vacuum adapter. Attach a clamp and tighten the retaining nut with a flat-blade screwdriver.

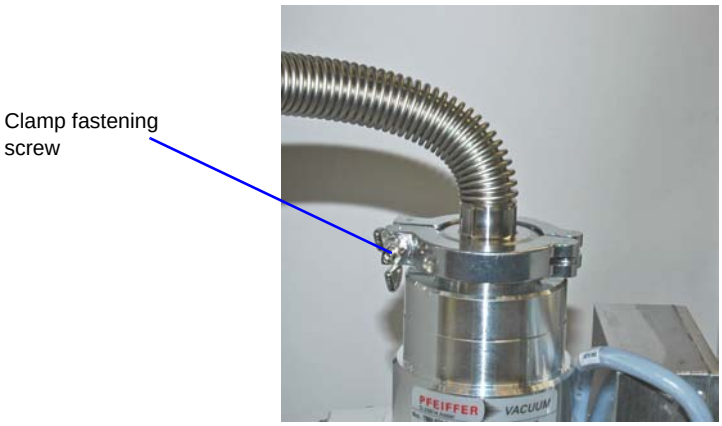


8. Plug the vacuum pump power cord into an appropriate power source.

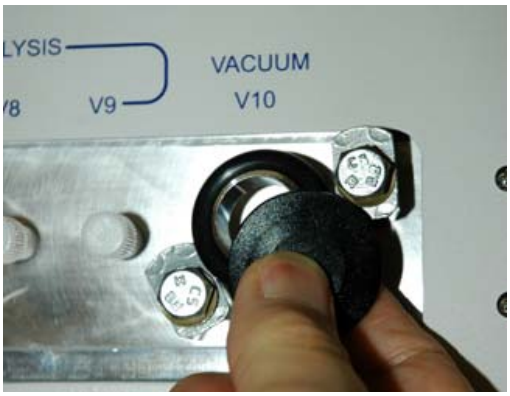
High Vacuum / Oil-free Pump Combination

Attaching the Hose

1. Place an opened clamp around the hose connection. Swing the clamp fastening screw around until it fits on the other half of the clamp. Tighten the wing nut securely by hand.



2. Loosen the screw on the vacuum port on the rear panel of the instrument. Use a wrench if necessary. The remove the port cap and centering ring.



3. Route the vacuum hose form the pump to the inlet port on the rear panel of the analyzer. Place the centering ring removed in Step 2 onto the hose flange.

4. Place the hose flange in the vacuum port. Tighten the two retaining screws with a wrench.

Applying Power to the Pump

1. Set the voltage on the pump to 115V or 230V to match your environment.
2. Plug the vacuum pump power cord into an appropriate power source.
3. Place the dry pump power source on the back of the pump enclosure in the ON position.
4. Place the vacuum pump power switch on the front of the pump enclosure in the ON position.

Non-Micromeritics Provided Vacuum Pump

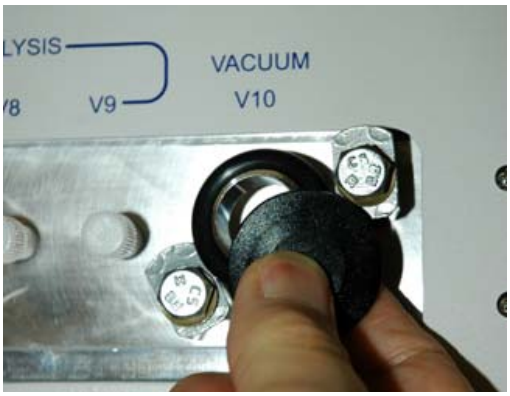
Attaching the Hose

Prepare the vacuum pump according to the directions in the vacuum pump operator's manual. Follow the instructions for the type of hose to be installed:

- Rubber
- Metal

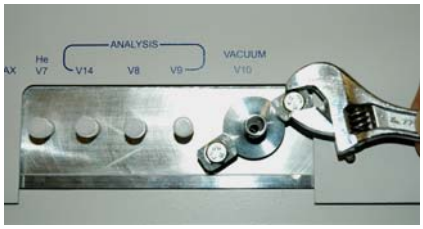
Rubber Hose

1. Loosen the screws on the vacuum port on the rear panel of the analyzer. Then remove the port cap and centering ring.

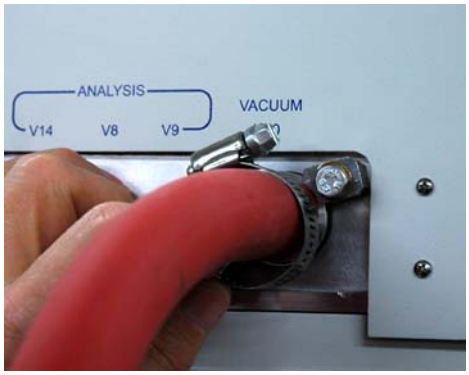


2. Place the centering ring removed in Step 1 and the vacuum adapter in the vacuum port.

3. Tighten the two port screws by turning then clockwise with a wrench.



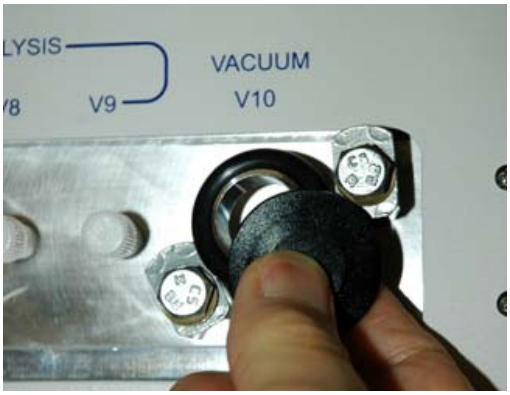
4. Place the vacuum hose over the vacuum adapter. Attach a clamp and tighten the retaining nut with a flat-blade screwdriver.



5. Plug the vacuum pump power cord into an appropriate power source.

Metal Hose

1. Loosen the screws on the vacuum port on the rear panel of the analyzer. Then remove the port cap and centering ring.



2. Route the vacuum hose from the pump to the inlet port on the rear panel of the analyzer. Place the centering ring removed in Step 1 on the hose flange.

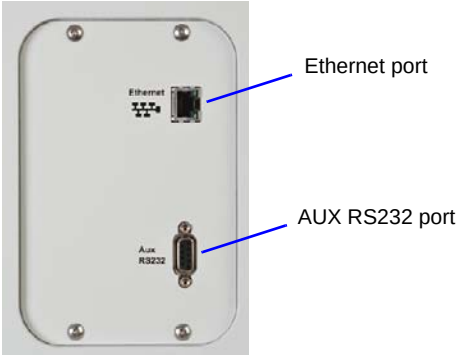
3. Place the hose flange in the vacuum port. TIghten the two retaining screws with a wrench.

4. Plug the vacuum pump power cord into an appropriate power source.

Connecting Network Cables

Connecting One Analyzer

1. Plug the Ethernet cable into the port labeled Ethernet on the right side of the analyzer.



2. Plug the other end of the Ethernet cable into the Ethernet port on the computer.

3. If connecting a SmartPrep to the analyzer, connect the RS232 null modem cable into the AUX port of the analyzer.

Connecting Multiple Analyzers

An Ethernet switch is required when connecting multiple analyzers to the computer.

Ethernet Switch

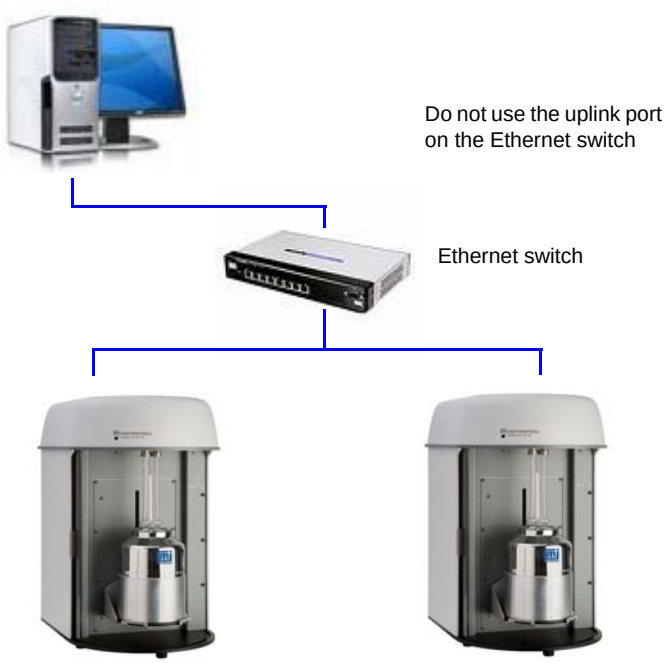
1. Connect the power cord of the Ethernet switch to an appropriate power outlet.

2. For each analyzer, connect an Ethernet cable from the Ethernet port on the rear of each analyzer to a numbered port on the Ethernet switch taking care not to use the uplink port on the switch.

3. Use an Ethernet cable to connect the computer to the Ethernet switch. Do not use the uplink port.

4. Ensure the power is turned on to the computer and the Ethernet switch.

The finished configuration should look similar to the following:



Applying Power to the Analyzer

1. Place the TriStar II Plus analyzer power switch, located on the analyzer's back panel, in the ON (|) position.

2. Check the Power indicator on the front of the analyzer. A green light indicates that power is applied to the analyzer.

Connecting the SmartPrep to the Analyzer

No additional software is necessary for the SmartPrep. SmartPrep functions are built into the analyzer program.

1. Place the SmartPrep ON/OFF switch in the OFF position.

2. On the computer, close the analysis program if it is running.

3. Two RS232 cables are included in the SmartPrep accessories. A null modem and a straight-thru cable. Typically, the null modem is black and the straight-thru cable is gray. For the TriStar II Plus, connect one end of the null modem into the AUX RS232 port on the analyzer and connect the other end to the RS232 port on the SmartPrep.

4. Place the SmartPrep ON/OFF switch in the ON position.

5. On the computer, start the analysis program. The SmartPrep will automatically connect.

Part 2. Software Installation

Installing the Micromeritics Software

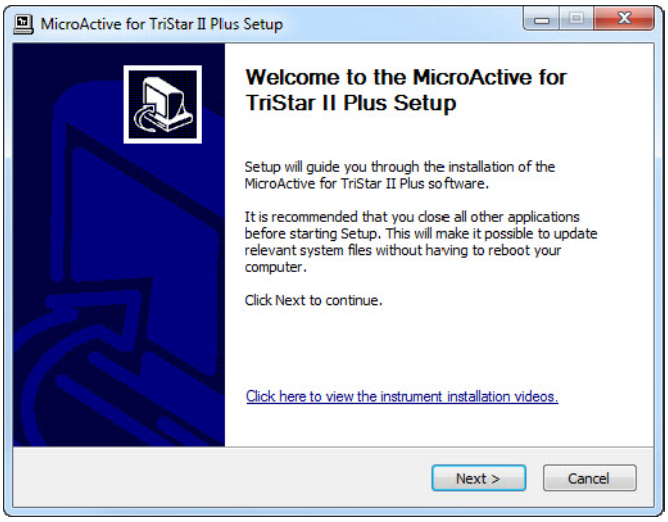
The following prerequisites must be completed prior to installing the software:

- Configure an Ethernet port on the computer to communicate with the analyzer. Refer to **Ethernet Configuration**, page **A-1**.
- Attach the analyzer to the computer's configured Ethernet port and turn on the power to the analyzer.

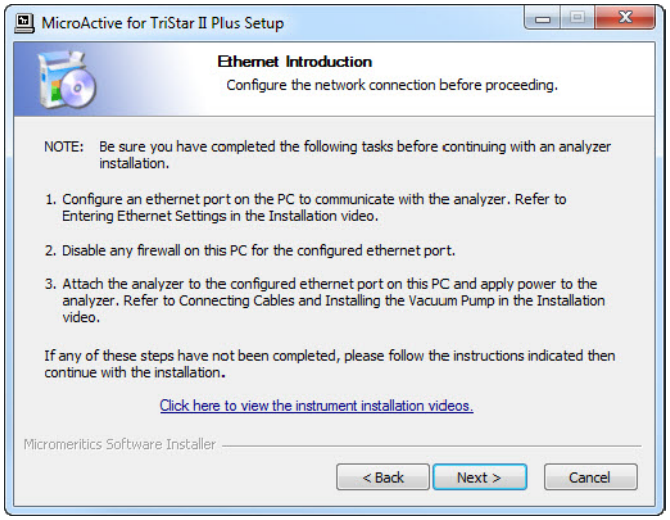
If installing multiple analyzers, connect the Ethernet switch to the computer's configured port and connect the analyzers to the Ethernet switch. Refer to Ethernet Switch, page **18**. **Then turn the analyzers on.**

The application should not be installed on a network drive with shared access. Multiple users cannot operate the application at the same time.

1. Insert the installation CD into the CD-ROM drive. The program automatically starts the installation. If the installation does not immediately start, navigate to the CD-Rom drive, locate and double-click the **setup.exe** file.
2. The **Welcome** screen displays. Click **Next.**



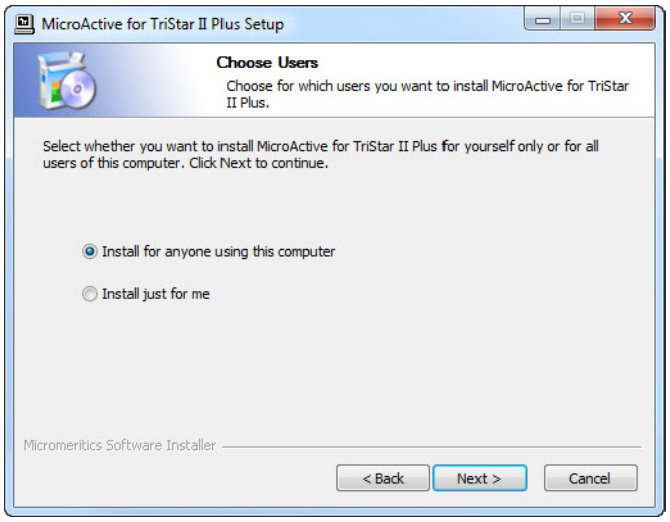
3. On the **Ethernet Introduction** screen, verify that all prerequisites have been met. If not, click **Cancel** and complete the steps, then restart the installation program. Do not proceed with installation until these tasks have been completed. If the prerequisites have been met, click **Next**.



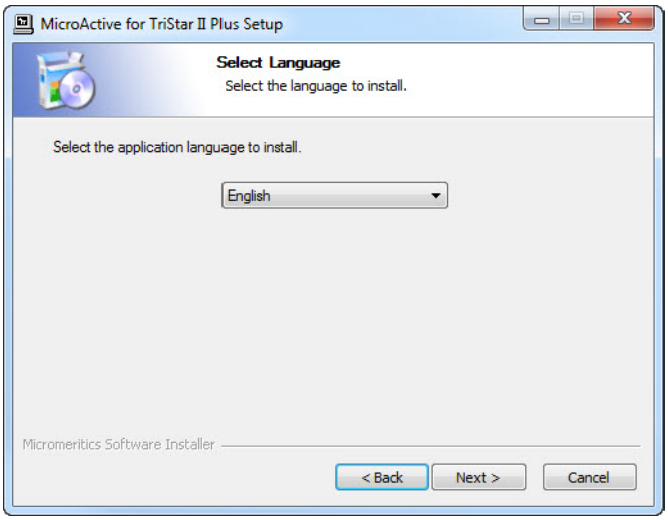
4. On the **Choose Users** screen, select either of the following, then click **Next**:

   - **Install for anyone using this computer** - anyone who logs on to this computer will have access to the analyzer program.

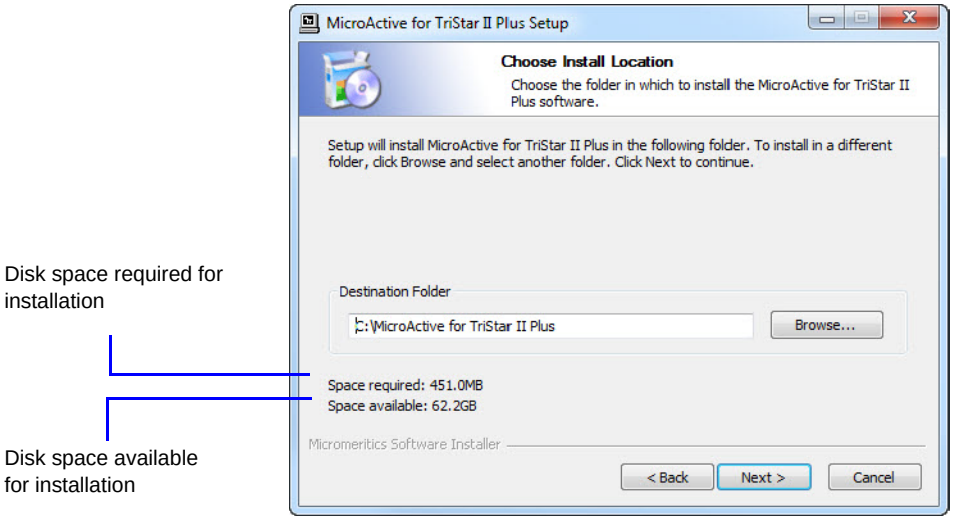
   - **Install just for me** - only the person logged on to the computer at the time of installation will have access to the analyzer program.



5. On the **Select Language** screen, select the default language of the program, then click **Next**.

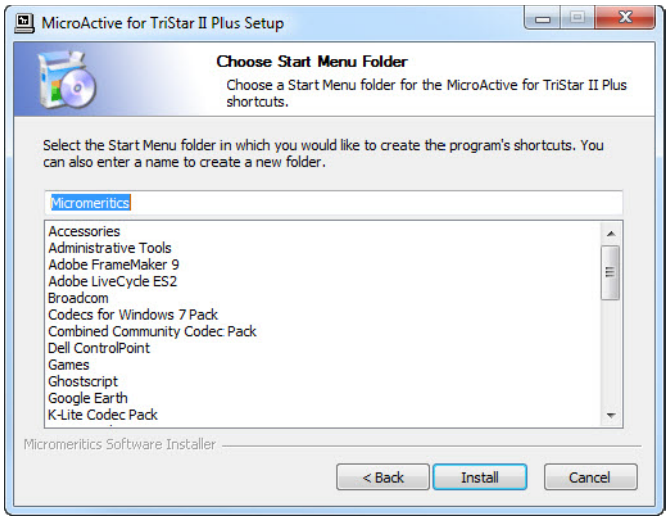


6. On the **Choose Install Location** screen, verify that sufficient disk space is available to continue the installation. If not, click **Cancel** and free up the minimum required disk space. If the disk space is OK, click **Next** to accept the default installation directory or click **Browse** to change the installation location, then click **Next**.

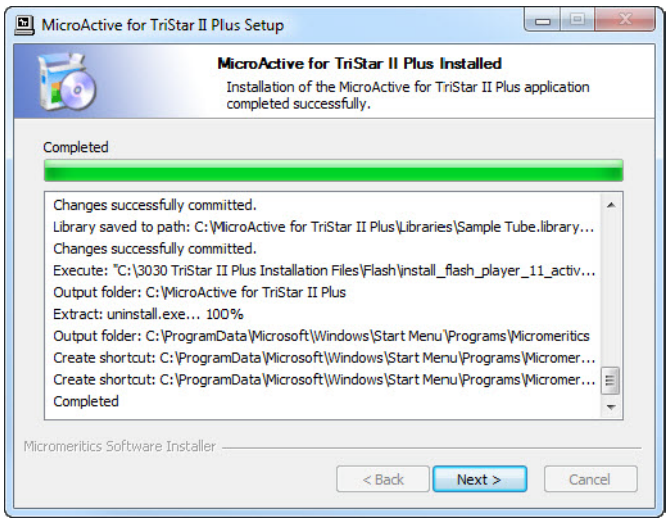


7. On the **Choose Start Menu Folder** screen, select a folder for the program shortcut. Select one of the following:

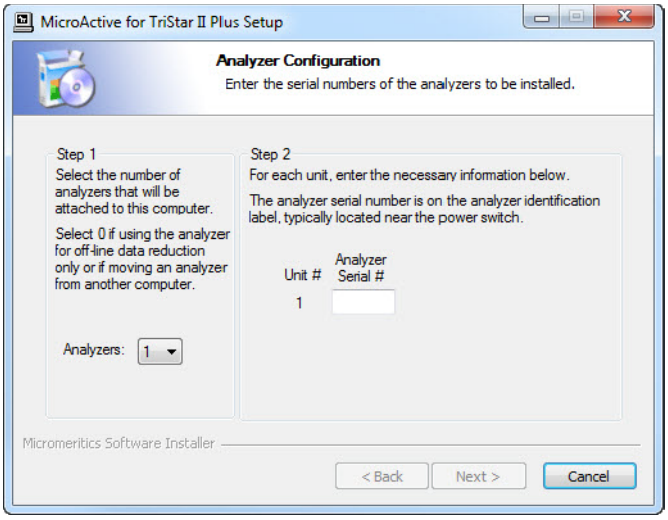
   - click **Install** to accept the default location
   - select another folder from the list, then click **Install**
   - enter a new folder name in the text box, then click **Install**



8. When installation completes, the **TriStar II Plus Installed** screen displays. Click **Next**.



9. The **Analyzer Configuration** screen is used to configure the system for each analyzer and serial number to be installed.



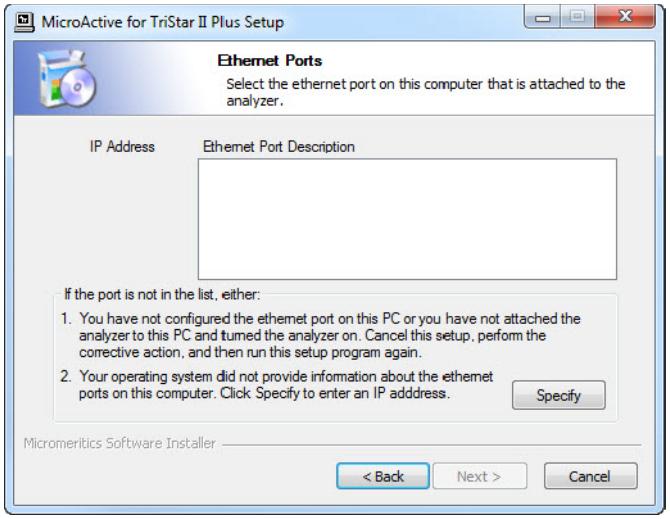
In the **Step 1** group box:

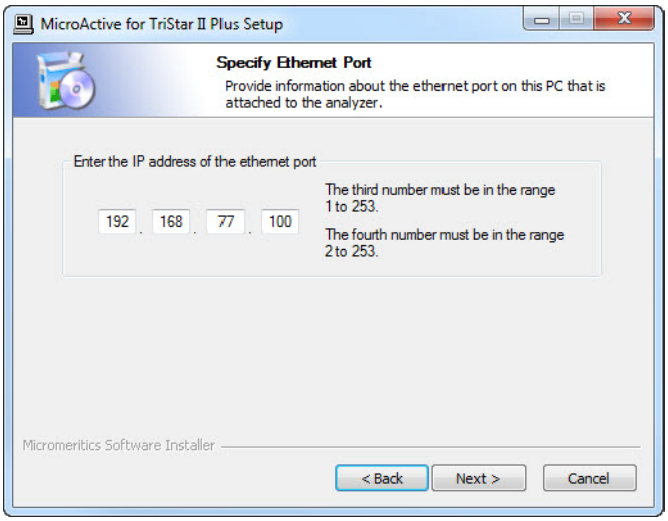
If...	Then...
installing the analysis program during initial installation	select the number of analyzers to be installed
using the analysis program for offline data reduction	select **0**
moving an analyzer from another computer to this computer	select **0**

a.) In the **Step 2** group box, enter the serial number for each analyzer to be attached to this computer. The analyzer's serial number label is located on the read of the instrument above the **Line Voltage Selection**.

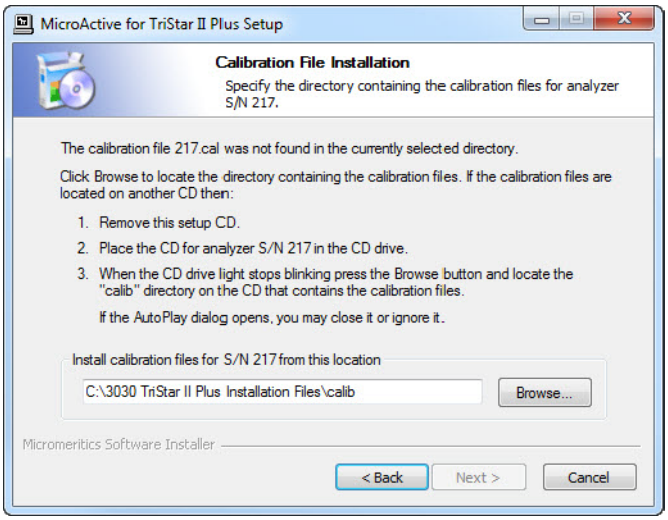
b.) Click **Next**.

10. On the **Ethernet Ports** screen, select one option from the following table:



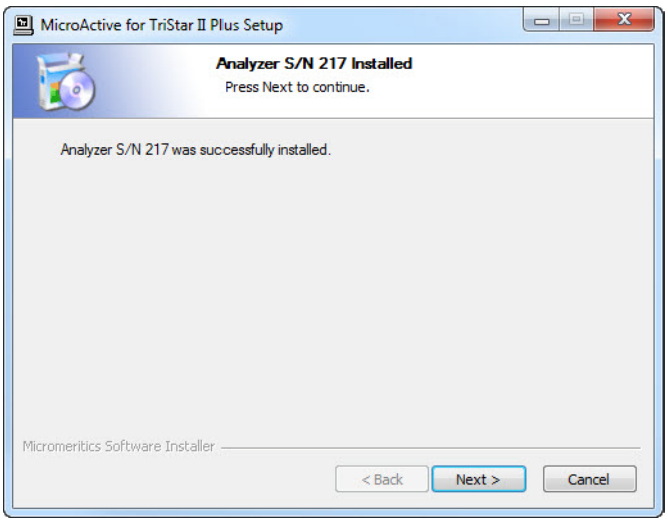
If...	Then...
the configured port is listed	Select the port then click **Next** to proceed to the next step.
the configured port is not listed	Click **Specify**. On the **Specify Ethernet Port** screen, enter the remaining portion of the IP address in the enabled fields, then click **Next**. 

11. The **Calibration File Installation** screen displays.

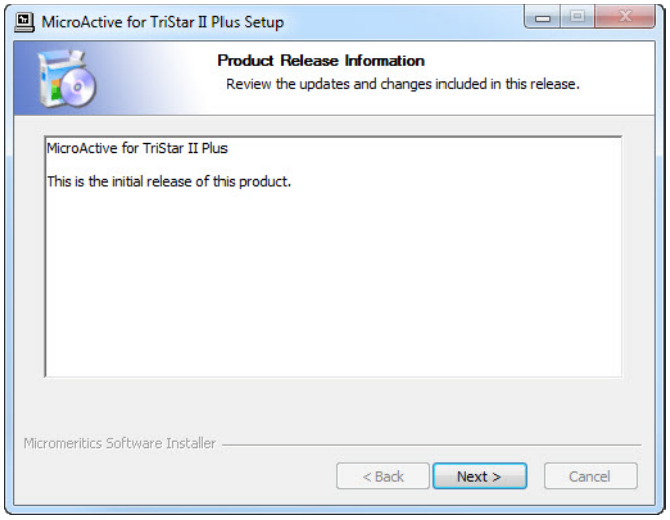


Calibration files are located on a separate calibration CD. Replace the setup CD with the calibration CD and browse to the ***\calib*** directory. Select the calib directory and click **Next**.

12. The **Analyzer S/N *[n]* Installed** screen displays. Click **Next**. A screen displays for each unit installed.



13. The **Product Release Information** screen displays containing information about updates and changes included in the release. Click **Next** to continue.

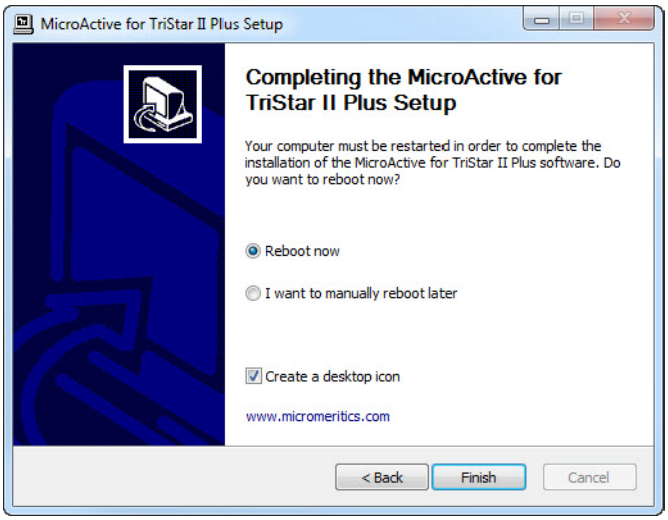


14. The **Product Registration** screen displays. Click the appropriate link to register the product or to log into the customer's portal or click **Next** to continue and register later.

15. The **Completing the TriStar II Plus Setup** screen displays. Select one of the following:

    - Reboot now
    - I want to manually reboot later

    Select the **Create a desktop icon** checkbox to have the system install a program shortcut onto the desktop, then click **Finish** to close the Setup program.

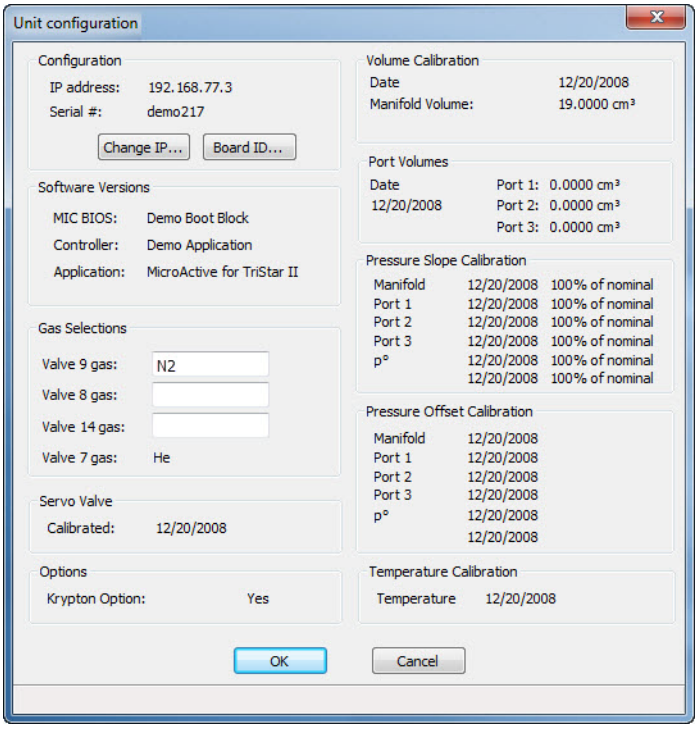


Starting the TriStar II Plus Application

To start the TriStar II Plus application, double-click the TriStar II Plus shortcut on the desktop or select the TriStar II Plus application from the Windows program list.

Specifying Gas Ports

1. Select ***Unit [n]*** > ***Unit Configuration***.

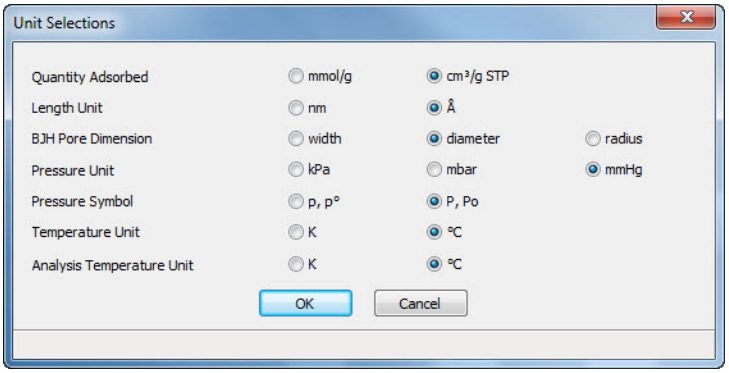


2. In the **Gas Selections** fields, enter the gas attached to each of the ports.

3. Click **OK** to save the information and close the window.

Specifying Units of Measure

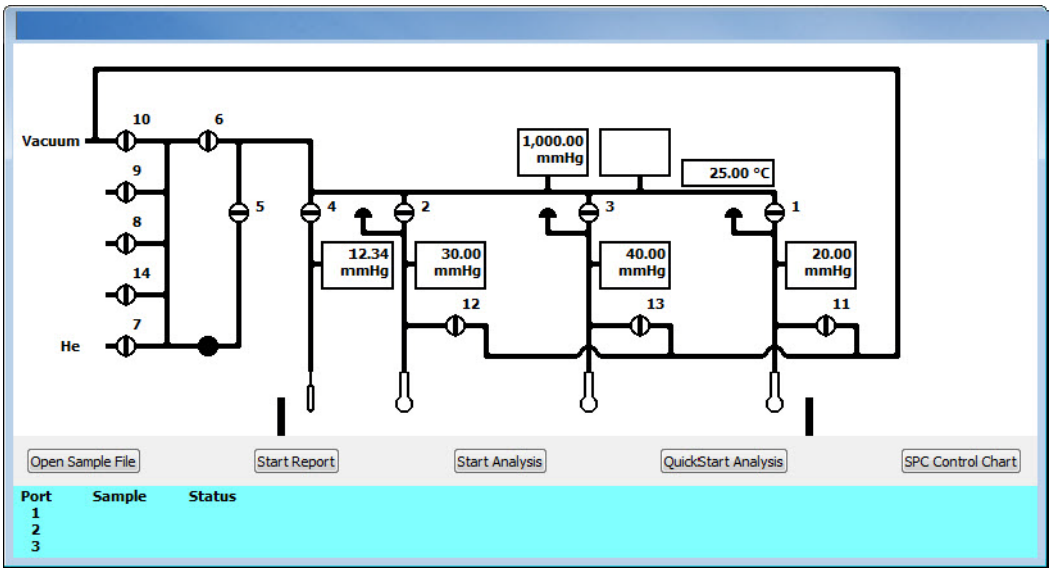
The software allows you to specify the units of measure to fit the laboratory's needs. The units in this set of instructions are expressed as shown below. Units of measure can be changed at ***Options*** > ***Units...***.



Manifold Evacuation

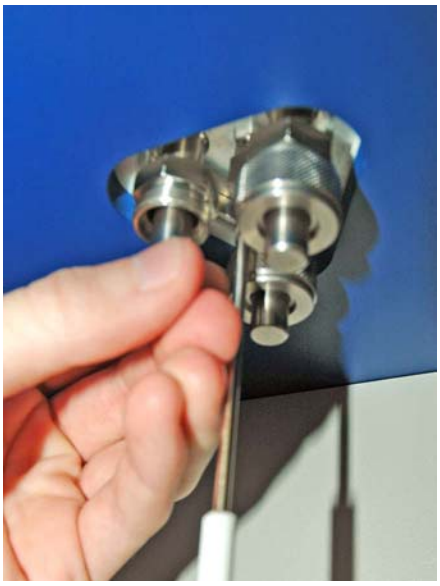
Prior to the connection of the gas lines to the instrument, the manifolds are evacuated to prepare them for the installation of the gas lines.

1. Go to ***Unit [n]*** > ***Show Instrument Schematic***.

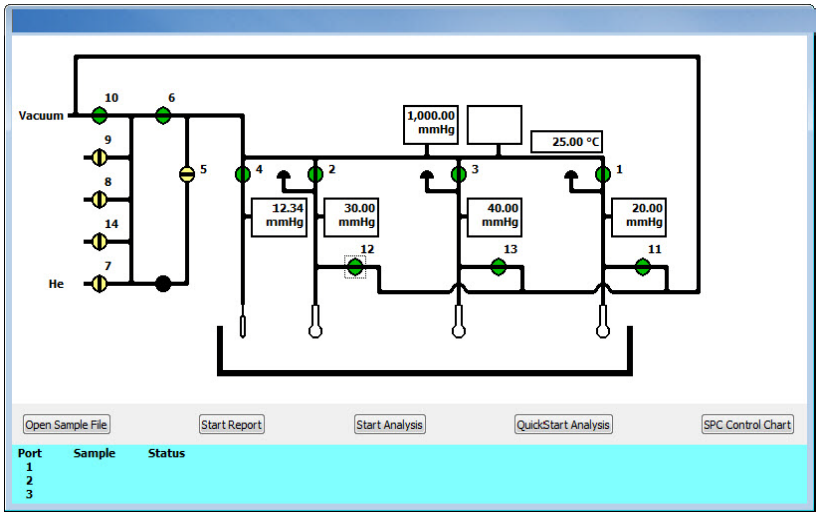


2. Go to ***Unit [n]*** > ***Enable Manual Control*** to place the instrument into manual control mode.

3. Verify that all 3 plugs are installed on the sample ports.



4. Open valves 1- 4, 6, 10, 11, 12 and 13 by double clicking on the valve. This will allow the analysis components to be evacuated at the same time other installation tasks are completed.

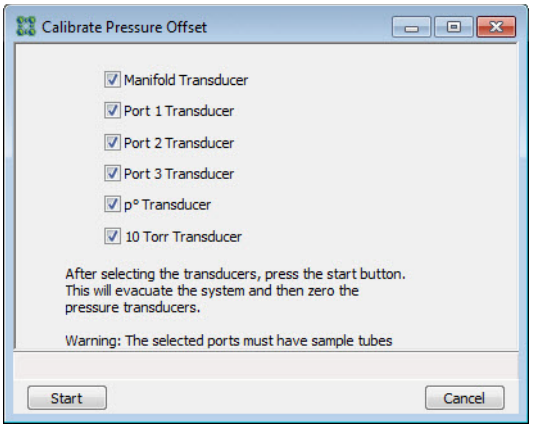


5. All four transducer readings should begin to pull down. The transducer readings should all come down to 0.00 ± 0.30.

   - If the instrument cannot pull down this low, check the vacuum pump connections for leaks, including the oil vapor trap O-rings, and check the oil level.

   - If the transducer readings are within tolerances, wait 15 to 20 minutes to allow the manifold time to clean up under vacuum

Go to ***Unit [n]*** > ***Calibration*** > ***Pressure Offset*** to zero the transducers. Select all transducers and click **Start**. Verify the pressure transducers have been zeroed.



Part 3. Gas Connections

Connecting a Regulator and a Gas Line to a Gas Bottle

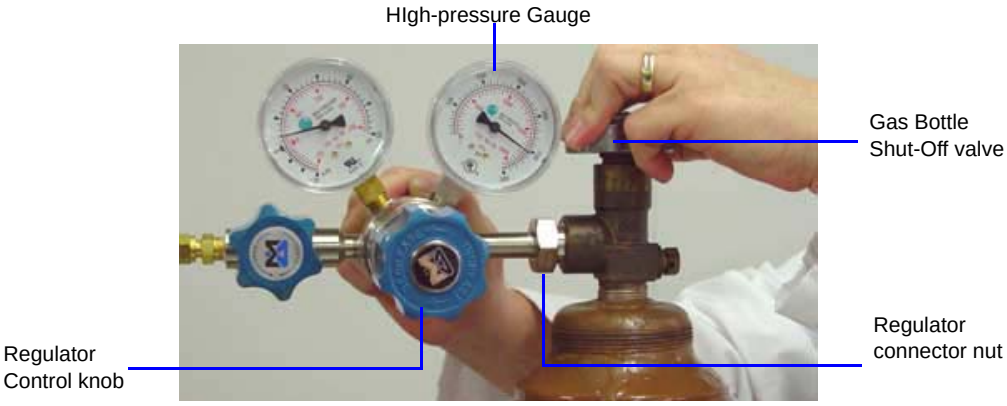
These instructions refer to the installation of a gas line, regulator, and gas bottle for each type of gas used. Expansion kits or other accessories may be used in the lab. If so, you will have to give consideration to these configurations when installing the gas lines.

1. Move the gas bottle close to the instrument and tether it in place.

2. Use an appropriate cylinder wrench to remove the protective cap from the bottle.

3. Attach the gas regulator to the connector on the gas bottle. Hand-tighten the nut, then use an appropriate wrench to tighten an additional 3/4 turn.

4. Check for leaks at the high-pressure side of the regulator and in the connector.



a.) Turn the regulator control knob fully counterclockwise.

b.) Slowly open the gas bottle shut-off valve, then close it.

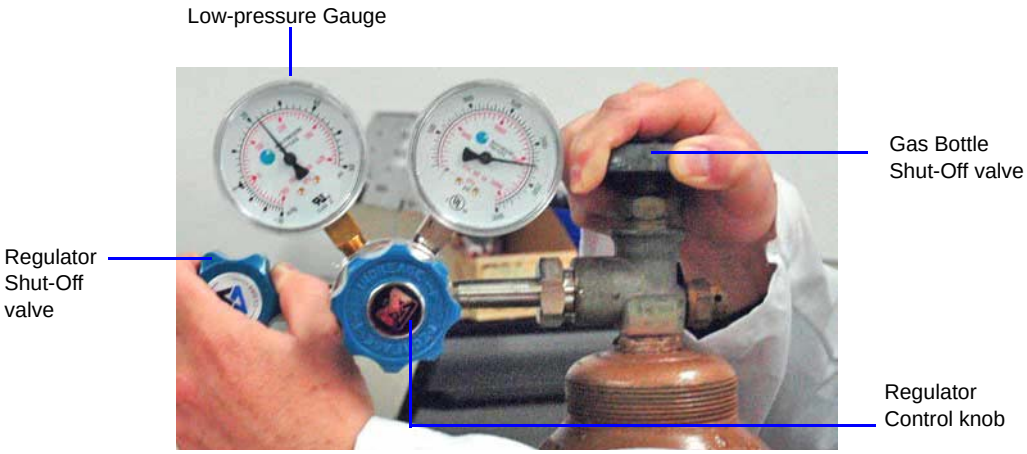
c.) Observe the pressure on the high-pressure gauge.

- If the pressure is stable, proceed with the next step.
- If the pressure decreases, tighten the regulator connector nut until it becomes stable.

5. Purge the air from the regulator.

This step applies to non-hazardous gases only.

.



a.) Turn the Regulator Control knob clockwise until the low-pressure gauge reads 15 psig (103 kPag).

b.) Turn the Regulator Shut-off valve counterclockwise to open.

c.) Open the Gas Bottle Shut-off valve to flow gas.

d.) Close the Regulator Shut-off valve to stop flow.

e.) Close the Gas Bottle Shut-off valve.

6. Connect the gas line to the regulator.

a.) Connect the gas line to the regulator connector.

b.) Use two 7/16 in. (11 mm) wrenches to tighten the gas line connection; one to hold the fitting steady and one to tighten the connector nut.

7. Purge the air from the gas line.

a.) Open the regulator shut-off valve.

b.) Open the gas bottle shut-off valve and flow gas for 10 to 30 seconds.

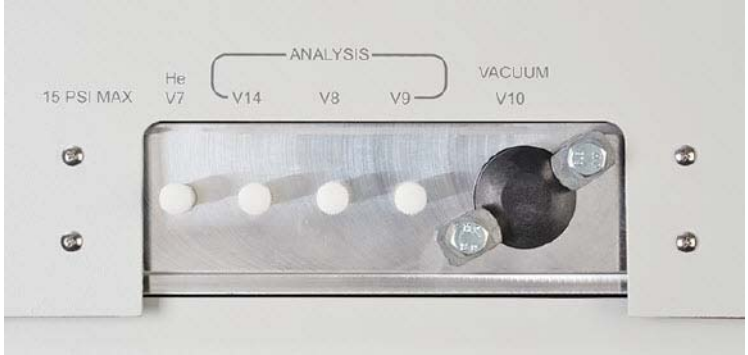
c.) Close the gas bottle shut-off valve and allow regulator pressure to go to zero.

Connecting Gases to the Instrument

The analyzer has gas inlets for up to 3 analysis gases and a dedicated inlet (valve 7) for helium.

Ensure the gas bottle is closed before connecting the gas line to the instrument.

1. Loosen, then remove the plug from the analysis port to be used.



2. Insert the gas line into the port and hand-tighten the connector nut. Use a 7/16 in. (11 mm) wrench to tighten the nut until very snug.

3. Connect all the remaining gases on available ports.

Gas Line Leak Check

Use the file *c:\.....\Service\gline[n].svt* file to check the gas lines from the instrument to the regulator when gases are connected to ports 7, 8, 9, and 14. Test one line at a time; plug all unused lines during testing.

Ensure that the gas bottle shutoff valve is closed and the regulator valve is open and the pressure is zero.

1. To go into Service Test mode, go to ***Options*** > ***Service Test Mode*** and enter the password.

2. Go to ***Unit [n]*** > ***Service Test*** > ***Start***.

3. Click **Browse** and select the file named *gline[n].SVT*. Click **Open**.

4. Click **Edit** and enter an operator name in the **Operator** field.

5. Click **Save all as** and enter a new file name in the **File name** text box. An example of a file name would be *gline[n]-SN.SVT* where SN is the serial number of the instrument. Click **Save**. This will create a copy of the original file with the new operator name.

6. Click **Close** to close the file saved in step 5. Click **No** when prompted to save the file.

7. Click **Browse** to locate and open file created in step 5.

8. Click **Start** to begin the test. The test will take approximately one hour. A report is generated at the completion of the test verifying that it has passed or failed. If failed, check the gas line and regulator for leaks.

If the test fails, address the problem and rerun the test.

Part 4. Operational Verification

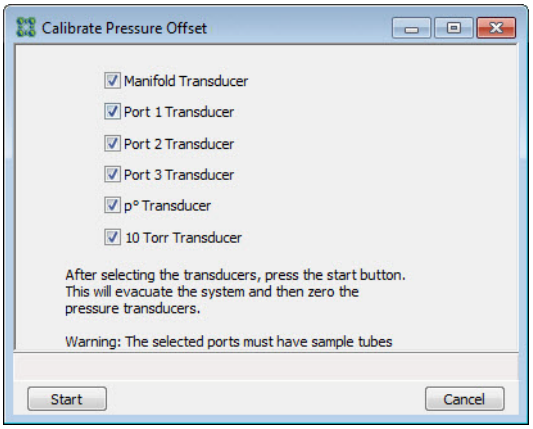
Checking the Instrument Calibration

- 003-09662-10 Pressure Gauge
- 512-09800-00 Temperature Calibration Standard

Check the Pressure Offset

Unit [n] > Calibration > Zero Pressure

Used to evacuate the manifold and zero the transducers.



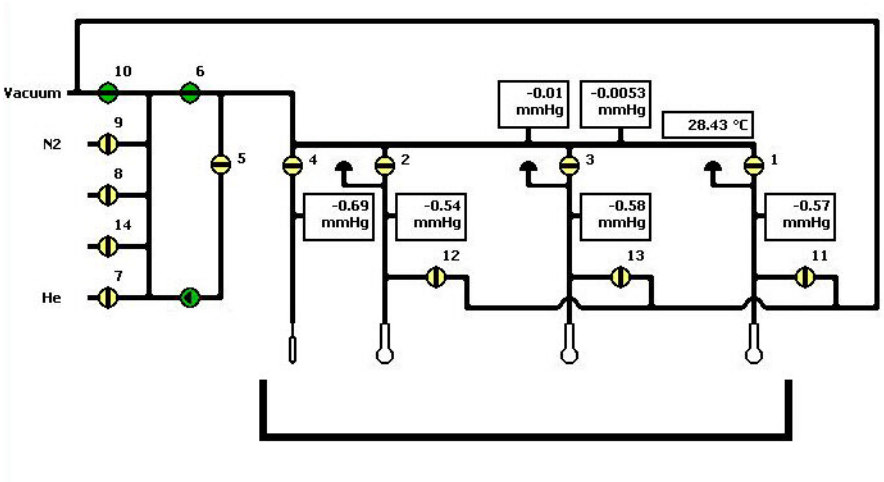
Only the transducers currently installed are enabled.

1. Select all applicable transducers.
2. Click **Start**. The current pressure readings and operation status messages display. When the calibration is complete, a confirmation message is displayed with the event log message for pressure transducer offset calibration. Click **OK.**

Check the Pressure Scale

Checking Transducer Pressure Scale Calibration

1. Go to ***Unit [n]*** > ***Enable Manual Control***.



2. Open valves 1, 2, 3, 4, and 5. Ensure all other valves remain closed.

3. Use the servo valve to manually pressurize the system including the three sample ports and Po tube to 760 mmHg by right clicking on the servo valve, click **Set,** then select **Automatic**, and **Dose**, and enter 760 mmHg as the **Target Pressure**. Click **OK**.

4. Open the N2 gas valve. When the main manifold transducer reaches 760 mmHg, close the N2 gas valve.

5. Remove one of the port plugs. The pressure on all transducers will read atmospheric pressure.

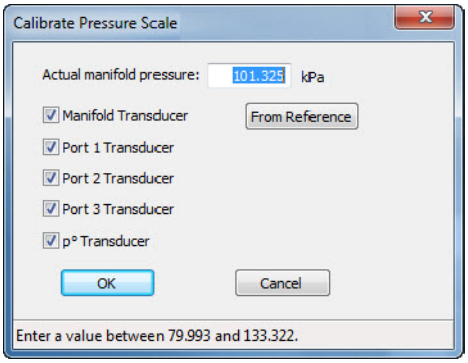
6. Check all transducer readings against your external pressure gauge. If the readings are within 2 mmHg, do not change the transducer's calibration.

   If transducer readings differ more than 2 mmHg from your external gauge, calibration may be needed.

7. To calibrate, go to ***Unit [n]*** > ***Calibration*** > ***Pressure Scale***.

8. Use a pressure gauge to determine atmospheric pressure.

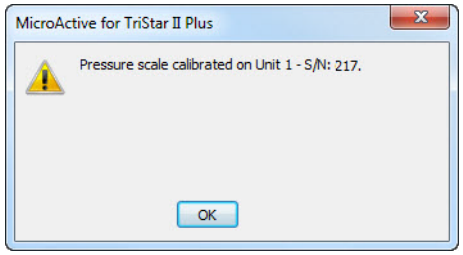
9. Select all transducer(s).



10. Enter the pressure from the pressure gauge in the **Actual manifold pressure f**ield.

11. Click **OK** to close the window.

12. A confirmation message is displayed. Click **OK**.

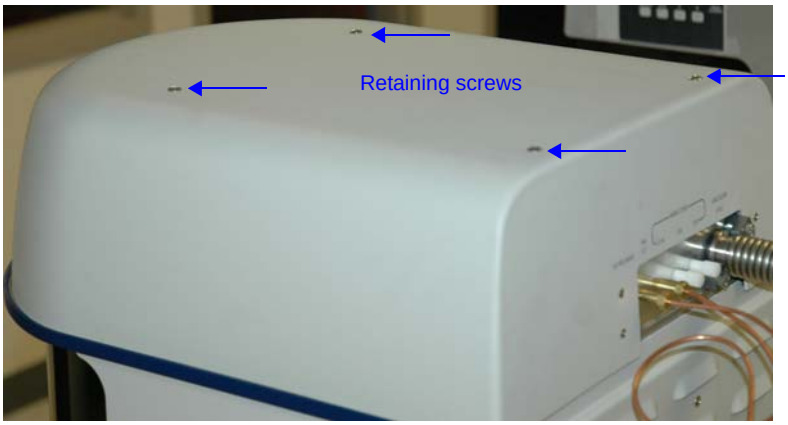


The 10 mmHg transducers should not be calibrated at this time.

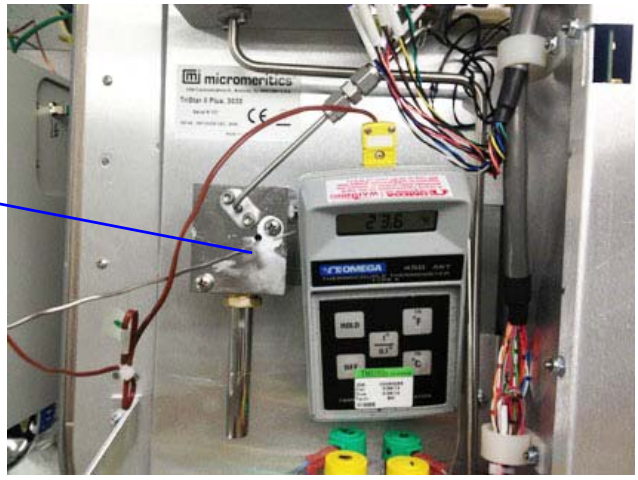
Temperature Calibration

The instrument must be at operating temperature before checking the calibration.

1. Remove the four retaining screws from the top of the analyzer.

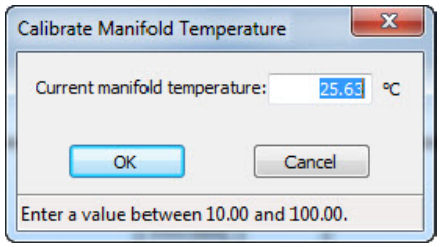


2. Remove the top panel from the analyzer.
3. Locate the dosing manifold and insert the temperature probe into the hole next to the RTD.



4. Place the top panel back on the unit; do not replace the screws.
5. Wait until the temperature stabilizes (approximately 1 to 2 minutes).
6. Remove the cover.

7. Select ***Unit [n]*** > ***Calibration*** > ***Temperature*** from the main menu.



8. Enter the temperature obtained using the calibration device, then click **OK**.

9. Remove the temperature probe from the analyzer.

10. Reattach the top panel using the four screws removed in step 1. Insert each of the screws and turn slightly. When all four screws are in place, tighten each with a screwdriver.

Transducer Verification

To verify all transducers are within specification, use the following table to check and record scale of transducers.

1. Enter all atmospheric transducer readings in row 1.
2. Reinstall port plug.
3. Ensure valves 1, 2, 3, and 4 are open. Open valves 5 and 8. Right click on the servo valve, click **Set**, select **Automatic**, **Evacuate**, and enter **500** in the **Target Pressure** field. Click **OK**.
4. All transducer readings should go to 500 mmHg. Close valve 5. Record all readings.
5. Right click on the servo valve, click **Set**, and enter **300** in the **Target Pressure** field.
6. Open valve 5. Record all readings. Do the same for all targeted pressures readings.8

External Gauge	**Targeted Pressures Readings**	**Port 1**	**Port 2**	**Port 3**	**Main Manifold**	**Po**
ATM Reading		**ATM Reading**	**ATM Reading**	**ATM Reading**	**ATM Reading**	**ATM Reading**
Tolerance ± .5 mmHg	500					
Tolerance ± .5 mmHg	300					
Tolerance ± .5 mmHg	100					
Tolerance ± .5 mmHg	20					
Tolerance ± .3 mmHg	9					
Tolerance ± .3 mmHg	5					
Tolerance ± .3 mmHg	2					
Tolerance ± .2 mmHg	.08					

Cleaning and Labeling Sample Tubes

The equipment shown in the following section may differ slightly from your equipment however the process remains the same.

Sample tubes and filler rods must be clean and dry before samples are added and weighed. The following procedures are recommended. Refer to the following table for a list of materials needed to clean and weigh samples.

Supplied by Micromeritics	Supplied by Users
• Sample tube • Filler rod (if used) • Sample tube brush • Stopper for sample tube • Sample tube rack • Sample weighing support • Sample data worksheet (copied from Appendix A of the Operator's manual)	• Drying oven • Ultrasonic cleaning unit • Detergent • Rubber gloves or lint-free cloth • Acetone or isopropyl alcohol • Safety glasses • Waste container • Analytical balance

1. Preheat drying oven to 110 ºC.

2. Verify that the ultrasonic cleaning unit is clean.

3. Using 5 grams of Alconox® (or other suitable detergent) per 500 mL of warm water, fill the reservoir of the ultrasonic unit with enough water to cover the sample tubes and filler rods. Make sure the detergent is dissolved before placing the sample tubes and filler rods into the water. If too much detergent is used, it may be difficult to rinse from the sample tubes.

4. Fill the sample tubes with warm water and place them in the ultrasonic cleaning unit. Then place the filler rods in the unit. Turn on the ultrasonic cleaning unit for approximately fifteen minutes .

5. Use rubber gloves to ensure no oils or residue are transferred to the clean tubes and filler rods and remove the sample tubes and filler rods from the unit.

6. Clean the interior of the sample tubes with the brush supplied with the system.

7. Rinse the sample tubes and filler rods thoroughly with hot water. Then rinse again with isopropyl alcohol or acetone. If isopropyl alcohol or acetone is not available, deionized water may be used.

8. Stand the sample tubes on the sample tube rack and place the filler rods in a basket or in the rack. Bake in a vacuum oven for two hours at 110 °C.

9. Remove the sample tubes and filler rods from the oven and allow them to cool.

	Do not insert the filler rods at this time. Filler rods are inserted just before the sample tube is installed on the analysis port.

10. Wipe a rubber stopper with a lint-free cloth.

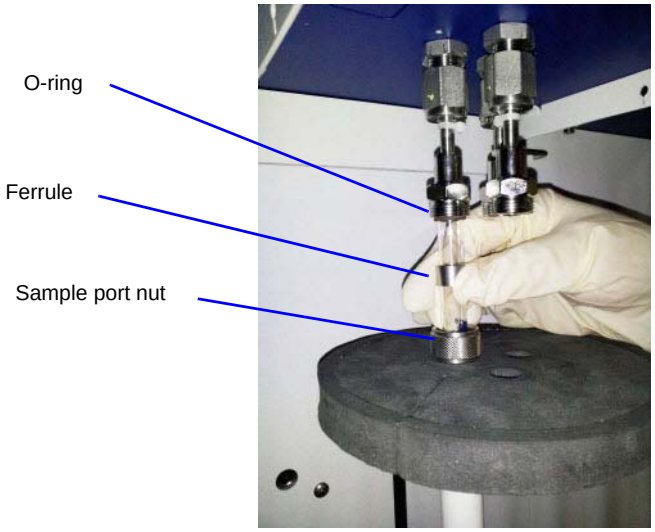
11. Label the sample tube and stopper for identification.

Performing an Empty Tube Analysis

The equipment shown in the following section may differ slightly from your equipment however the process remains the same.

1. If Service Test mode is not enabled, enter Service Test mode (***Options*** > ***Service Test Mode)***. A password is required.

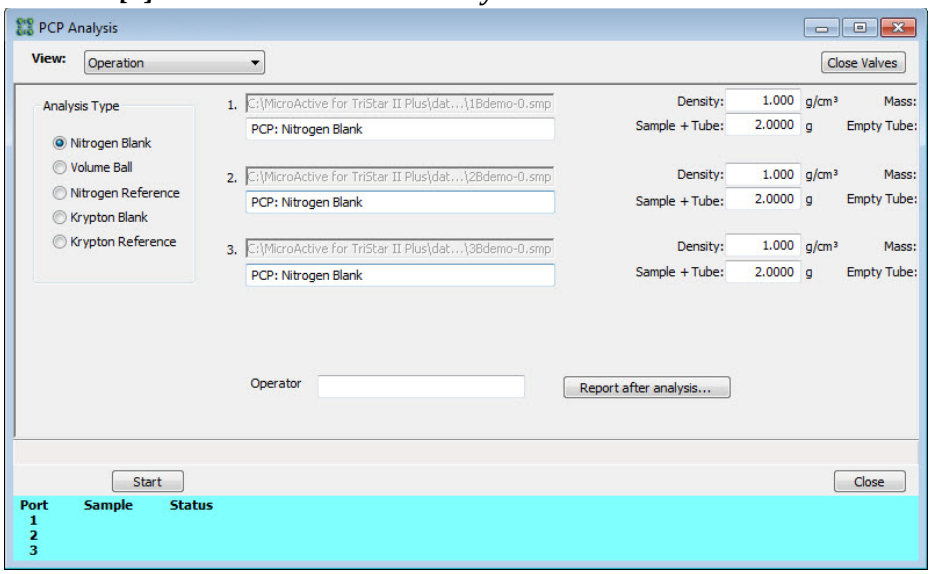
2. Install blank tubes with filler rods and isothermal jackets into each of the sample ports. Ensure the O-rings are in good condition. Ensure the Dewar cover is within 3/4 in. (19 mm) below the sample port nut.



3. Fill the Dewar with LN_2 and check the level using the dipstick.

4. Place the Dewar on the elevator and close the Dewar shield.

5. Go to ***Unit [n] > Service Test > PCP Analysis***.



6. Select **Nitrogen Blank**.

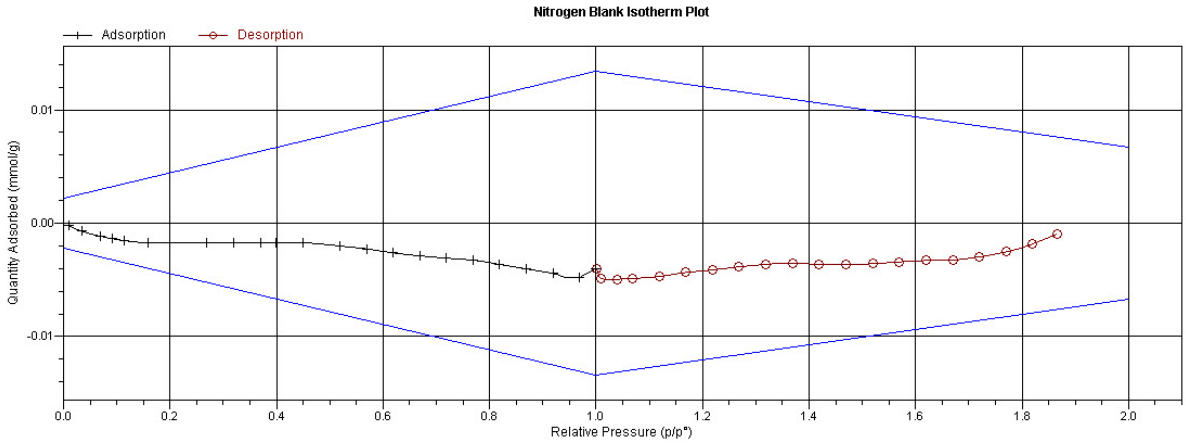
7. Click **Start** to begin the analysis.

8. When the analysis completes, to view the report, go to ***Reports > Start Report***. Locate the report file in the *c:\.....Data\PCP* directory. An example of the file name is *1B217-0.SMP* where the first digit is the port number (1, 2, or 3), the letter B (for blank), the unit serial number (217), and -0 (1, 2, 3, etc.) to indicate the number of the run.

9. Select the report and click **Report**.

10. On the **Report Settings** window, select **Preview** as the destination for the report and click **OK**.

11. Click the **Report** icon 1, 2, or 3 to view reports. Scroll the tabs across the top of the report to locate the **Nitrogen Blank Isotherm Plot**. The run and upper and lower limits will display.



Performing a Reference Material Analysis

A reference analysis is used to verify that the instrument is operating properly and producing optimum results. These methods provide specifications for critical report quantities and reporting of whether the quantities are in or out of specification.

Weighing Samples

1. Place the sample weighing support on the balance. Tare the balance and allow it to stabilize at zero (0).

2. Place the sample tube set (empty sample tube and stopper) on the sample weighing support, and place it on the balance.

3. Record the stabilized mass as **Mass for empty sample tube set**. Remove the sample tube set from the balance.

Do not touch the sample material with bare hands while performing the following steps. Doing so could affect the accuracy of results.

4. Place a sample container on a balance. Tare the balance and allow it to stabilize at zero (0).

5. Slowly add the specified amount of reference material to the container.

6. Remove the rubber stopper from the sample tube.

7. Pour the reference material from the weighing container into the sample tube.

8. Replace the rubber stopper.

9. Reweigh the sample. Record as **Sample tube set plus sample mass**.

10. Subtract the mass recorded in step 3 from the mass recorded in step 9 to obtain the **Sample Mass**.

Degassing Samples

Degas the sample materials on a SmartPrep, FlowPrep, or VacPrep for the amount of time specified on the data sheet included with the reference material.

- Silica Alumina Reference Material
- Carbon Black Reference Material
- Alumina Reference Material (for Krypton units)

If a SmartPrep was purchased, there are two ways to degas the sample:

- Manually degas the sample by setting the temperature and turning on the gas flow. To do this, go to ***Unit [n]*** > ***Degas*** > ***Show SmartPrep Status***. Ensure the gas flow for each port has been set so that a steady stream of bubbles can be seen in a beaker of water. This ensures a sufficient flow of gas will flow over each sample).

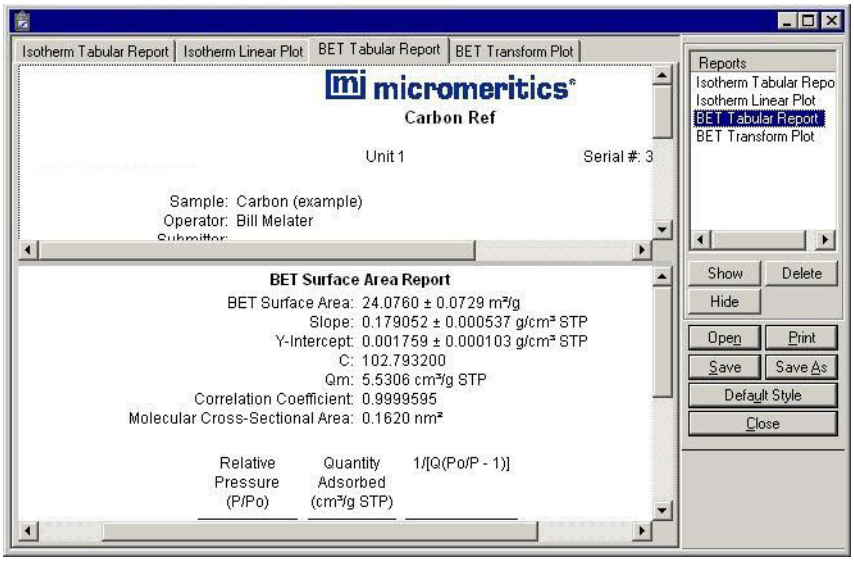
- Create a sample file with degas conditions then go to ***Unit [n]*** > ***Degas*** > ***Start SmartPrep*** Degas. Select the sample files containing the degas conditions parameters.

Performing the Reference Analysis after Degassing

The equipment shown in the following section may differ slightly from your equipment however the process remains the same.

1. After removing the sample tubes from the degassing unit, reweigh the samples.
2. Place the filler rods into the sample tubes. Place the isothermal jackets on the sample tubes and install the tubes on the sample ports.
3. Go to ***Unit [n]*** > ***Service Test*** > ***PCP Analysis***.
4. Select the correct sample for the instrument:
   - **Nitrogen** - if the instrument is a nitrogen unit.
   - **Krypton** - if running an alumina sample for a krypton analysis.
5. Click **Start** to begin the analysis.
6. When the analysis completes, to view the report, go to ***Reports*** > ***Start Report***. Locate the report file in the *c:\.....Data\PCP* directory. An example of the file name is *1N217-0.SMP* where the first digit is the port number (1, 2, or 3), the letter N (for Nitrogen), the unit serial number (217), and -0 (1, 2, 3, etc.) to indicate the number of the run.
7. Select the report and click **Report**.
8. On the **Report Settings** window, select **Preview** as the destination for the report and click **OK**.

9. When the analysis is complete, compare the BET Surface Area shown in the report with the BET Surface Area shown on the reference material bottle.



- If the results are within tolerance, the instrument is operating properly.
- If the results are not within tolerance, refer to the following table for possible causes and actions. After performing the action, perform the reference analysis again.

Cause	Action
The sample was not degassed properly.	Degas the sample again.
The gas lines are not clean.	Clean and verify the gas lines. Refer to **Cleaning and Verifying Gas Lines**, page **55**.
The measured free space is too high. This indicates the helium may not be pure enough.	Ensure the helium is 99.999% pure.

Part 5. Checklists

Checklist Description

The tables in the checklist contain the columns described below:

Procedure	Description / Action
Evaluation Code	Circle an evaluation code for each procedure according to the following criteria: • **P = Pass** - indicates that this procedure has been successfully completed without error. • **F = Fail** - indicates that this procedure has been unsuccessful and prevents the instrument from being installed for use. • **N/A = Not Applicable** - Indicates that this procedure does not apply to your system.
Yes / No / NA	Circle the appropriate response to each question. • **Y = Yes** - indicates that this procedure has been performed. • **N = No** - indicates that this procedure has not been performed. • **N/A = Not Applicable** - Indicates that this procedure does not apply to your system.
Initial/Date	Enter your initials and the date. If the procedure was completed by another person, that person should enter their initials and the date.

Preparing for Installation

Procedure	Evaluation Code	Initial / Date
Review the Preinstallation Instructions and Checklist and ensure that the laboratory is prepared for installation.	**P F N/A**	
Ensure that the required personnel are available.	**P F N/A**	
Ensure that all equipment has been unpacked and verified using the packing list.	**P F N/A**	

Connecting Cables

Procedure	Evaluation Code	Initial / Date
Connect the power cord to the analyzer and power source.	**P F N/A**	
Connect the Ethernet cable to the analyzer and computer.	**P F N/A**	

Entering Ethernet Settings

Procedure	Evaluation Code	Initial / Date
Enter the Ethernet settings.	**P F N/A**	

Installing the Analysis Program

Procedure	Evaluation Code	Initial / Date
Install the TriStar II Plus application software.	**P F N/A**	

Procedure *(continued)*	Evaluation Code	Initial / Date
Start the TriStar II Plus application.	**P F N/A**	

Connecting Gases

Procedure	Evaluation Code	Initial / Date
Evacuate manifold.	**P F N/A**	
Specify units of measure.	**P F N/A**	
Verify that Nitrogen is selected.	**P F N/A**	

Cleaning and Verifying Gas Lines

Procedure	Evaluation Code	Initial / Date
Make sure the analysis gas line valves are in the correct state: • Gas bottle shut-off valve **Closed**. • Regulator shut-off valve fully **Open.** • Pressure control knob fully **Open**.	**P F N/A**	
Perform the gas line test for helium and nitrogen lines.	**P F N/A**	
Make sure the helium and other gas line valves are in the correct state, if applicable: • Gas bottle shut-off valve **Closed**. • Regulator shut-off valve fully **Open**. • Pressure control knob fully **Open**.	P F N/A	

Verifying Instrument Operation

Procedure	Yes / No / NA	Initial / Date
Have the transducers been zeroed?	**Y N N/A**	
Have the 1000 Torr pressure transducer calibrations been checked.	**Y N N/A**	
Were calibrations needed for the 1000 Torr transducers?	**Y N N/A**	
Was the table in the Transducer Verification section completed?	**Y N N/A**	
Was the temperature calibration checked?	**Y N N/A**	
Were the sample tubes cleaned?	**Y N N/A**	

Procedure *(continued)*	**Yes / No / NA**	**Initial / Date**
Were blank sample tubes installed?	**Y N N/A**	
Was the Dewar prepared?	**Y N N/A**	
Did you perform the blank tube analysis?	**Y N N/A**	
Did the blank tube analysis run within tolerance?	**Y N N/A**	
Did you degas the required reference material?	**Y N N/A**	
Was sample mass determined?	**Y N N/A**	
Did you check the LN_2 level in the Dewar?	**Y N N/A**	

Reference Material Analyses

Perform one set of reference materials analyses: either **A**, **B**, or **C** depending on the instrument configuration.

The actual results must match the expected results, within the specified tolerance range, in order for this procedure to pass.

A. Silica Alumina Reference Material	Yes / No / NA	Initial / Date
Port 1 **Expected BET results: _____ ± _____** Actual BET results: _____ Expected Total Pore Volume results: _____ ± _____ Actual Total Pore Volume results: _____	 **Y N N/A** **Y N N/A**	
Port 2 **Expected BET results: _____ ± _____** Actual BET results: _____ Expected Total Pore Volume results: _____ ± _____ Actual Total Pore Volume results: _____	 **Y N N/A** **Y N N/A**	
Port 3 **Expected BET results: _____ ± _____** Actual BET results: _____ Expected Total Pore Volume results: _____ ± _____ Actual Total Pore Volume results: _____	 **Y N N/A** **Y N N/A**	

B. Carbon Black Reference Material	Yes / No / NA	Initial / Date
Port 1 **Expected BET results:** _____ ± _____ Actual BET results: _____	**Y N N/A**	
Port 2 **Expected BET results:** _____ ± _____ Actual BET results: _____	**Y N N/A**	
Port 3 **Expected BET results:** _____ ± _____ Actual BET results: _____	**Y N N/A**	

C. Alumina Reference Material *(for Krypton Units Only)*	Yes / No / NA	Initial / Date
Port 1 **Expected BET results:** _____ ± _____ Actual BET results: _____	**Y N N/A**	
Port 2 **Expected BET results:** _____ ± _____ Actual BET results: _____	**Y N N/A**	
Port 3 **Expected BET results:** _____ ± _____ Actual BET results: _____	**Y N N/A**	

Exceptions

Procedures categorized as **Fail** or **No** should be explained below.

Procedure	Comments	Initial / Date

Signatures

Installer *(Please print)*

Name:	Signed:
Position:	Date:
Company:	Field Service Report Number:

Customer Representative *(Please print)*

Name:	Signed:
Position:	Date:
Company:	Field Service Report Number:

Final Documentation

In order to provide consistent instrument service, Micromeritics retains records of installation, operational verification, and calibration data in its Service Support Center in Norcross, Georgia, USA. After completing the installation process, representatives of Micromeritics who install instruments are required to send the following documents to Micromeritics for inclusion in the customer's instrument history.

- Completed Field Service Report
- Completed and signed, TriStar II Plus Installation Checklist
- Blank Tube Analysis Sample Files
- Reference Material Analysis Sample Files

A. Ethernet Configuration

This section contains instructions for configuring an Ethernet port in either Microsoft® Windows 7. The instructions do not apply to any other operating system.

Windows 7 Professional is recommended for the best user experience.

Configuring the Ethernet Port

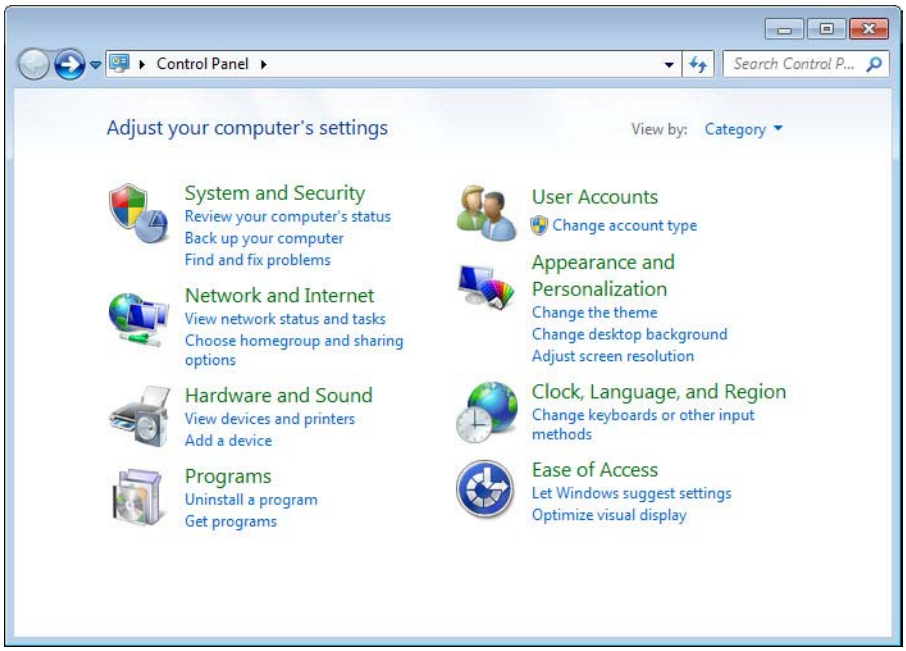
The computer and analyzer communicate by means of an Ethernet connection. This appendix contains instructions for ensuring that the Ethernet connection operates properly.

The windows in this section are Microsoft operating system windows, which may be subject to change. The windows are included for reference purposes only.

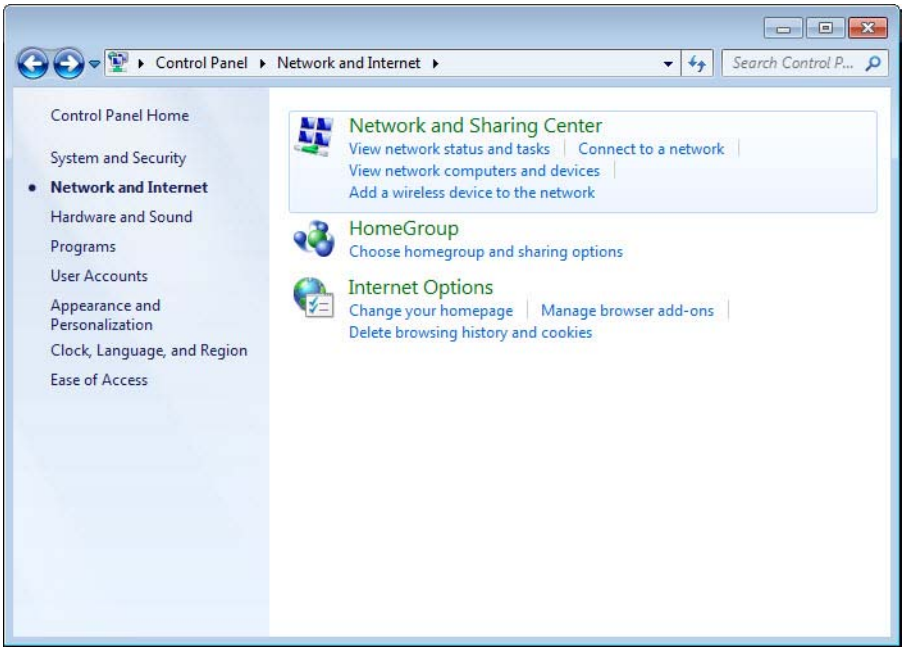
Methods to access to these windows may vary. Refer to the Windows help system for assistance, if necessary.

1. Select the **Windows icon** from the Status bar at the bottom of the screen, then select **Control Panel**.

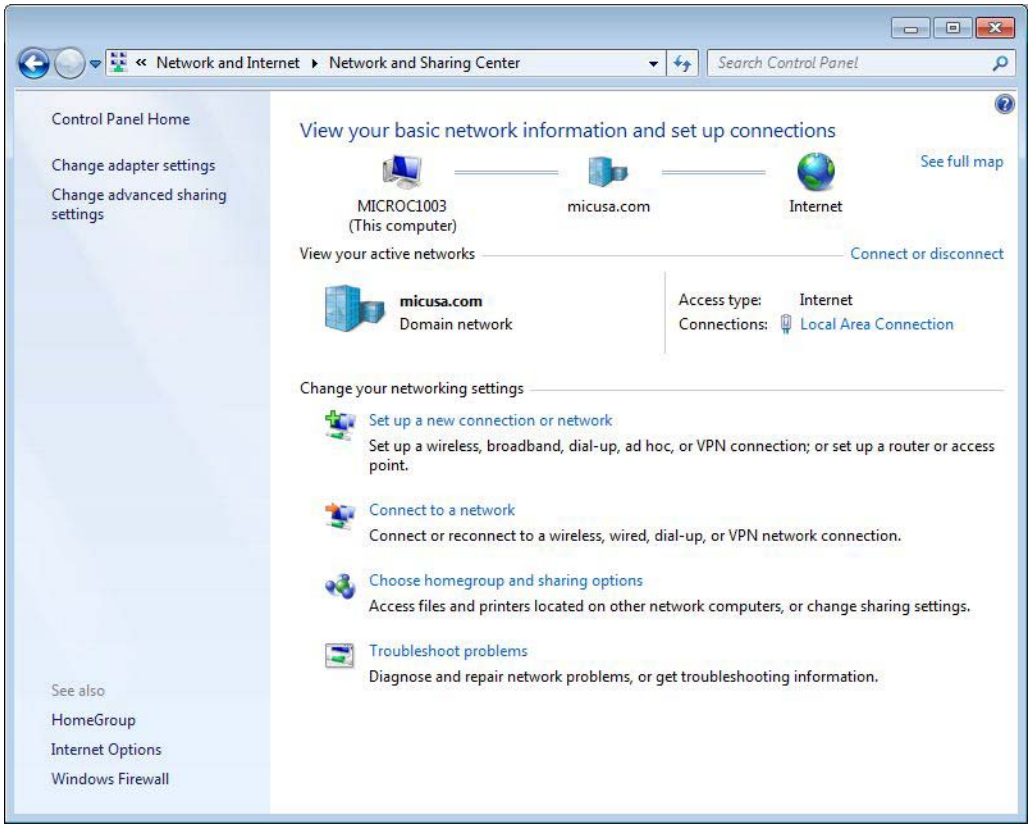
2. Click **Network and Internet.**



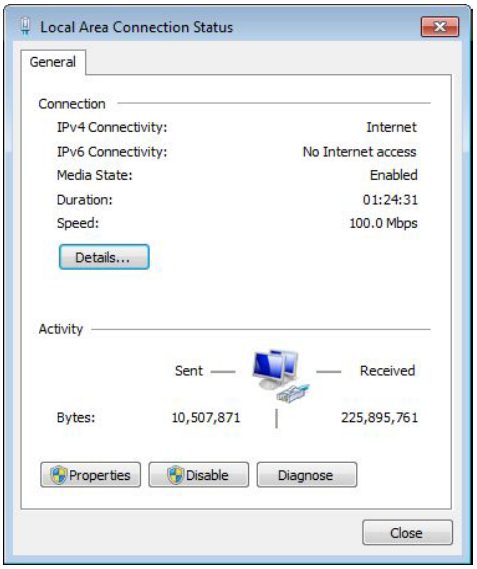
3. Click **Network and Sharing Center**.



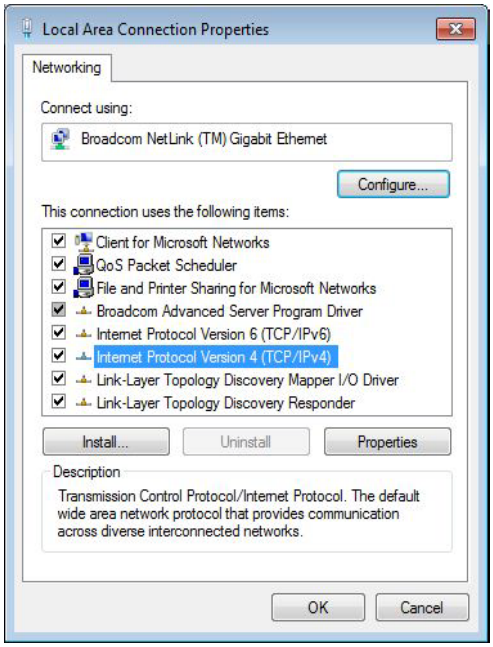
4. Click the **Local Area Connection** for your analyzer.



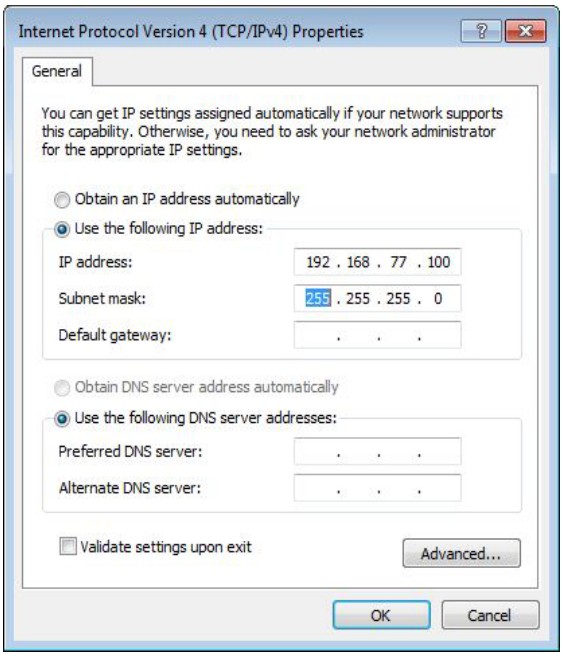
5. Click **Properties**.



6. Highlight **Internet Protocol Version 4** then click **Properties**.



7. Click **Use the following IP address** then enter the following in the **IP address** field: **192 168 77 100**.



8. The following numbers should display in the **Subnet mask** field: **255.255.255.0.** If not, enter them. Leave all other fields blank.

9. Click **OK** then click **Close** until all windows are closed.